

THREE SUCCESSFUL LAPAROTOMIES FOR INTESTINAL PERFORATION IN TYPHOID FEVER.¹

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I wish to report briefly three cases of perforation of the intestine following typhoid fever which were operated upon and recovered. These three cases occurred out of a series of thirteen in my service at the Episcopal and Pennsylvania Hospitals.

CASE I.—December 4, 1900, Episcopal Hospital. Male, aged twenty-nine years. Perforation in the third week of the disease. Since being in bed has had some sharp pain in lower abdomen. At 11 A.M. had a sharp, severe pain in the hypogastrium immediately after using the bedpan. Two hours later had a severe chill, after which the pulse became rapid and weak. The abdomen was hard, rigid, tender, and painful. I saw the patient in consultation about that time and advised immediate operation, but, owing to delay in obtaining permission from his family, he was not operated upon until five and one-half hours from the time of perforation.

Operation.—Ether. Incision along the right rectus muscle. On opening the abdomen a large amount of turbid fluid escaped; intestines and omentum red and congested; appendix adherent but not perforated. After the withdrawal of a number of coils of ileum, a small perforation was found about ten inches from the cæcum, apparently the centre of a Peyer's patch that was ulcerated, and which was easily closed with silk. A small amount of fecal matter had escaped, which was easily washed off with hot salt solution. After the abdomen and pelvis were thoroughly doused with normal salt solution the intestines were replaced.

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A glass drainage tube was carried well down into the pelvis, and the wound partially closed. The appendix was removed. Temperature, $103\frac{3}{8}^{\circ}$ F.

The convalescence was slow. In about three weeks the wound was closed. A week later the patient developed an empyema, which necessitated the introduction of a large drainage tube into the pleural cavity. Cultures from pus showed colon bacilli, streptococci, and bacillus *foetidus*. The patient rapidly recovered, and was discharged cured eighty-three days after operation for typhoid perforation.

CASE II.—Male, thirty-nine years of age. Pennsylvania Hospital. Admitted May 4, 1902. Had been sick for about ten days. On admission presented symptoms of peritonitis. Abdomen was tender and board-like. As soon as possible the patient was prepared for operation. Under ether, incision was made on edge of right rectus muscle; on opening abdomen about two pints of lemon-colored fluid escaped with flakes of lymph. Appendix much swollen and congested and was removed. Some distance from the cæcum a perforation was found in the ileum, which was closed with two rows of Lembert silk sutures. Much fecal matter had escaped. The abdomen was flushed out with hot salt solution, followed with equal parts of normal salt solution and hydrogen peroxide, and finally with normal salt solution, being then packed with five large pieces of gauze and the wound left open. On the third day after operation the packing was removed. The condition was good; abdomen flat. The gauze was replaced. Two weeks later temperature was normal, wound clean, but not healed. When apparently convalescent, the patient had a typical typhoid relapse, and was removed to the medical ward, where he had a second relapse two months after admission. He was discharged cured three months after operation, with slight ventral hernia.

CASE III.—Male, aged thirteen years. Pennsylvania Hospital. Operation, May 11, 1902. Patient was admitted to the medical ward with typhoid fever on April 4; present illness began on March 28. Ten days before admission had had headache, backache, cough, epistaxis, and diarrhoea. On admission, spleen was enlarged, abdomen soft and flat, temperature high. On the forty-sixth day of the disease the abdomen became distended and tender, with great muscular rigidity, although there was no marked evidence of any sudden perforation. Operation was ad-

vised, although the patient's condition hardly warranted surgical interference. Ether. Rigid cyanotic abdomen, with intense tenderness, rapid dicrotic pulse, and cold extremities. Incision on right side permitting the escape of about half a pint of straw-colored fluid and flakes of lymph. Appendix found in an ounce of pus, gangrenous and perforated, and was ligated and removed. On examination of the ileum, two perforations were found with some escape of fecal matter, and closed with silk sutures. Abdomen and bowel irrigated with hot salt solution, then with equal parts of salt solution and hydrogen peroxide, and finally with normal salt solution. Abdomen packed with large pieces of gauze; wound left open.

The convalescence was protracted and interrupted by two distinct relapses. The patient was finally discharged cured over three months from time of operation. Abdominal wound quite firm.

In reviewing these three successful cases, it will be noticed that they represent one from each of the three classes that are ordinarily brought to the surgeon's notice for operation. In the first one the perforation occurred during the middle of the disease with the patient in good condition, and was immediately recognized and operation advised. The only delay which arose was waiting for the consent of the patient's family, during which time the patient lost considerable ground. The second was of the ambulatory character, coming on suddenly in a patient who was not much exhausted from the effects of the disease, and presenting many of the characteristic symptoms of an acute appendicitis with perforation. This class is decidedly the most favorable for operation, and from it the greatest number of recoveries will be gathered. The third class is the most unfavorable, as the vital energies are almost entirely exhausted as the result of a prolonged and exhausting disease; and it is in these cases that the greatest difficulty is experienced in arriving at an accurate diagnosis whether perforation really does exist or not. Nevertheless, this third class illustrates how ill a case can be when operated upon and yet recover.

The key-note of success in dealing successfully with typhoid perforations is the early recognition of the lesion. At the best this is a most difficult procedure, and the diagnosis can best be made by the medical attendant who has carefully followed the case from the beginning, noticing all the trifling changes that occur in the abdomen. When any undue symptom arises, the surgeon should immediately be consulted, and with his aid and the carefully acquired knowledge of the medical attendant a correct diagnosis can generally be made. The classic symptoms of perforation when well marked can hardly be mistaken, such as pain, tenderness, rigidity, shock, chill, facial expression, and all the symptoms of peritonitis. To make an accurate diagnosis of perforation in the early stage, the medical attendant must be thoroughly conversant with the condition of the abdomen, and must be alert for the first symptom of muscular rigidity, which is one of the earliest and most important signs of intraperitoneal irritation.

Rigidity and spasm are terms so loosely used and so difficult of apprehension that it is not easy to reconcile oneself to these recorded statements. I believe that rigidity as understood by the surgeon differs from that interpreted by the physician, and, as just stated, is most difficult to properly estimate its significance in many cases; but if this sign is rightly interpreted, it is the key-note to the early detection of a perforation in a large proportion of cases. The ideal method would be for the surgeon to see regularly, in conjunction with the physician, all cases of typhoid fever day by day. The leucocyte count has proven of very little value at the time when most needed.

Cases with hæmorrhage are most perplexing, as these two conditions—hæmorrhage and perforation—may exist together, although they did not occur in my series. The absence of liver-dulness and the presence of flank-dulness are late signs, and are of little corresponding value. The facies is of value if carefully noted by the person in attendance, but is difficult to read by a stranger until peritoneal involvement is very marked.

Shock is regarded by some as an important symptom, and is undoubtedly present if sufficient time is allowed for its devel-

opment. No time should be wasted hoping that reaction will take place, for as every hour passes the greater will be the leakage from the intestine, causing greater soiling of the peritoneum. Immediate operation will enable us to prevent further soiling of the peritoneum, to repair the injury to the bowel, and reduce the danger of septic inflammation by suitable toilet followed by drainage, and also combat the existing shock and aid reaction by douching the abdominal cavity with hot salt solution.

Immediate operation should be urged even in the presence of profound shock, as every hour of delay proportionately decreases the chances of recovery.

The incision is preferably made on the right side, and is almost sure to lead down to the seat of perforation, which is always within a short distance of the cæcum. In hunting for the perforation, it is a good rule to start with the cæcum and appendix; then the last three or four feet of the ileum are examined, and as much of the ascending colon as can be exposed. If no signs of peritoneal infection are recognized during this examination, an error in diagnosis has been made, and further operative interference should be discontinued. If, however, signs of peritonitis are apparent, and the cause is not detected, a median incision should be made so that the entire length of the colon and the remaining small bowel can be carefully examined. A perforation may be easily hidden from sight by a piece of lymph, therefore all portions of the bowel that are indurated or covered by lymph should be carefully examined. It is safe to say that the lateral incision will be found the most satisfactory in 95 per cent. of cases operated upon. Out of 332 cases which I have carefully analyzed, in ninety-six the median incision was made with a mortality of 78.12 per cent. In the right lateral incision there were 123, with a mortality of 68.37 per cent. In the other cases operated upon, the site of incision was not mentioned. The more improved technique has undoubtedly reduced the mortality in these operations, which will be noticed in the appended table.

TYPHOID PERFORATION.

Recovered, 87; died, 245; total, 332; mortality, 73.79 per cent.

Operations.	Recovered.	Died.	Total.	Mortality.
1884-1888.....	1	9	10	90 per cent.
1889-1893.....	2	14	16	87.5 per cent.
1894-1898.....	28	82	110	74.5 per cent.
1899-1903.....	45	101	146	69.1 per cent.

In fifty cases, year of operation not stated.

Mortality for male sex, 78.5 per cent.

Mortality for female sex, 61.4 per cent.

When the perforation has been found and its closure will not produce too great stenosis of the bowel, it should be rapidly closed with silk sutures in whichever direction, either transversely or longitudinally, to the lumen of the bowel which produces the least narrowing of the gut. No time should be wasted on attempting to trim or freshen the edge of the ulcer, as the area of the bowel near a perforation is always so friable that stitches are liable to tear out. The best stitch for this purpose is the so-called mattress suture, as a running Lembert is liable to cut or tear through the friable tissues. When the opening is closed, the bowel should be carefully inspected for other perforations, as not infrequently these openings are multiple. Often dark necrotic spots will be found where the ulcer has destroyed the coats of the bowel down to the peritoneum, giving the appearance that in a short time another opening would be formed. All such suspicious places should be treated as though a perforation had taken place, and the weakened area fortified by being folded in with stitches. Occasionally, cases will be met with where the opening in the bowel is too large or the area inflamed too great, so that closure is not practicable. When this condition exists, there are four procedures offered. First, a plug of omentum may be so fashioned and stitched against the opening in the bowel as to form a simple patch, after the manner in which Nature sometimes deals with these conditions. Second, resection of the

bowel and an end-to-end anastomosis either with stitches or with a Murphy button, the latter being much more rapid. Third, the formation of an artificial anus by stitching the bowel to the abdominal wall, and, fourth, cutting off the damaged area of the bowel from the general peritoneal cavity by carefully placing pieces of gauze between the folds of the bowel.

The cleansing of the peritoneum and drainage are the most important procedures. It has been decided by some that when only the right lower quadrant of the abdomen is infected, the intestine should be brought outside of the abdomen and carefully cleansed with salt solution and gauze sponges, while the cavity within is sponged dry.

My best results have been where the peritoneum has been dealt with by vigorously flushing with salt solution, then with equal parts of salt solution and hydrogen peroxide, and finally douching with normal salt solution. This is best done by carrying a large tube down into the pelvis, and with vigorous flushing all foreign matter can be much more easily removed than by attempts at dry sponging. After the intestines are carefully replaced in the abdomen, a number of large gauze wicks are carried down to the bottom of the pelvis and to the different parts of the abdomen between the coils of intestine, so as to secure good free drainage. Little or no attempt should be made to close the abdominal wound, except it has been unusually large, when a couple of sutures at the upper angle can be introduced. The wound should have a liberal dressing of gauze applied over it, as it will in a short time become thoroughly saturated with fluid from the abdominal cavity through the medium of the gauze drains. These should not be disturbed for three or four days, after which time they can be removed without much difficulty by thoroughly saturating them with salt solution or hydrogen peroxide. They then should be replaced with a fresh gauze pack, which may be of less quantity, according to circumstances.

In reviewing my work in this gloomy field of surgery, I feel convinced that there are two important factors to be carefully considered. First, the early recognition of the lesion and

dealing with it as rapidly as possible, in order that as little time as possible will elapse from the time of perforation until operation has been performed; and, second, that the operation should be so planned, since time is so important an element, that not a moment should be wasted during it, the technique being of the simplest character, as every moment of delay will cause a much higher percentage of mortality.